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Clinical Manifestation, Tribe and Outcome of Sever Malaria in Elduiem Teaching Hospital (Sudan 2021)

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Abstract

Background: Malaria is the world's commonest and life threatening tropical diseases. It is one of the top three causes of child mortality in sub-Saharan Africa, including Sudan. If not treated within 24 hours, malaria can progress into fatal severe illness. Early diagnosis and treatment reduces disease, prevents deaths and can contribute to the reduction of malaria transmission.

Objectives: To assess the association between ages, tribe, clinical manifestation of severs malaria and outcome in ED-Dueim Teaching Hospital, Sudan.

Patients and Methods: This descriptive cross sectional, hospital based study conducted at ED-Dueim teaching hospital, during the period from September 2020 up to February 2021. Included all pediatric patients diagnosed with severe malaria admitted to the hospital during study period (n=177patients). Data collected by using questionnaire, then analyzed using the Statistical Package of Social Science (SPSS) computer program.

Results: Majority of patients 73.4% were with age group 0-5 years old , followed by 13.6% within age group 5-10 years old, 51%of patients were male and 49% were female, the most common tribes were Hassania represent 25.4% of patients, followed by Hawsa 14%, Dewahia 13%, Hassanat 6.8%, and 5.6% were Nuba. All patients presented with hyperpyrexia, 73.4% presented with hyperparacytemia, 39.5% with frequent vomiting, and 24.9% with severe anemia, then convulsion, hypoglycemia, jaundice, impaired consciousness, renal impairment and prostration. 51.4% of patients have normal plts count, 48.% have low Plts count while only 0.6% have high plts count. Among patients, 79.1% received Quinine, 12.4% were received Artesunate, while 6.8%received quinine then shifted to Artesunate. Conclusion: Majority of patients were with age group 0-5 years old, Male, from Hassania and Hawsa tribes. The commonest criteria of severe malaria among patients were hyperpyrexia, hyperparacytemia, and frequent vomiting. Quinine was the first choice for severe malaria treatment.

Keywords: Customer Engagement Value (CEV) • Customer Lifetime Value (CLV) • Customer Referral Value (CRV) • Customer Influencer Value (CIV) • Customer Knowledge Value (CKV) • System Dynamics (SD)

Introduction

Severe Malaria (SM) is defined by the detection of plasmodium falciparum and plasmodium vivax by laboratory diagnostic tests and at least one criterion for severe malaria which include impaired consciousness, respiratory distress, repetitive convulsions, prostration, shock, pulmonary edema, abnormal bleeding, jaundice, severe anemia, hypoglycemia, acidosis, hyperlactatemia, renal impairment, or hyperparasitemia [1]. Mortality can exceed 50% when multiple prognostic factors are present [2]. Approximately 81% of malaria cases and 91% of malaria deaths occur in the African region, where it remains one of the commonest causes of death and serious morbidity, especially for children, approximately 86% of malaria deaths globally are of children under 5 years of age [3]. In Sudan there are more than hundred thousand severe malaria cases being reported annually. Inpatient malaria death rate has been reduced from 8.4 deaths/100,000 population in 2000 to 1.8 deaths/100,000 population in 2016, there was no major change or slightly increased death rate during the period 2011–2016 and most of this decrease occurred between 2000 and 2010. Around one-third of malaria death is occurring among children below 5 years of age [4,5]. In fact in tropical countries with a high transmission of malaria (hyperendemic

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areas), severe malaria is predominantly a disease of young children (1 month to 5 years of age). Severe malaria accounts for approximately 5% of imported malaria cases (range 1–38%) [6]. However this does not mean that younger children are exempt from the death toll, the contrary is true given the fact that in addition to the well-known insertion through the blood meal of an infected female anopheles and through infusion of infected blood products, neonates and young infants might also be vertically infected by plasmodia crossing the placenta [7]. In various studies risk factors for severe malaria and death in children include, no antimalarial prophylaxis, delay in treatment, and severity of the illness at admission (coma, acute renal failure, shock, pulmonary edema, coagulation disorders) [8,9]. Moreover study in the tribal dominated area of Bastar division, Chhattisgarh, Central India, revealed that tribe associated significantly with complicated, sever malaria development [10].

The major complications of severe malaria include cerebral malaria, pulmonary edema, acute renal failure, severe anemia, and/or bleeding. Acidosis and hypoglycemia are the most common metabolic complications. Any of these complications can develop rapidly and progress to death within hours or days [11]. In many patients, several of these complications exist together or evolve in rapid succession within a few hours. In clinical practice, patients must be assessed for any of these signs or symptoms that suggest an increased risk for developing complications and must be treated immediately.

Malaria transmission in Sudan is highly linked with climatic conditions. There are two peaks of transmissions; one during the rainy season and the other during winter season. Malaria during the rainy season involves most of the areas in Sudan. The severity of is affected by seasonality in the different areas in different epidemiological contexts [11].

Malaria remains a major health challenge in Sudan with significant morbidity and mortality rate particularly among children. It has been estimated that approximately 90% of the world's severe and fatal malaria affects young children in Sub-Saharan Africa (SSA) [12,13]. Despite the life threatening complications of sever malaria in children but the available data about this problem in Sudan is limited to some area due to lack of basic health services, non-stability of the population, lack of follow-up, and non-availability of census data and death certificates leads to the lack of accurate number about the incidence of severe malaria and mortality in Sudan. Thus, most publications reported absolute numbers or frequency ratios. This situation prompts researchers to find reliable clinic-epidemiological information on severe malaria as a killer disease in children.

Methodology

A cross-sectional descriptive study design was used to allow empirical testing of the hypothesis conducted at ED-Dueim teaching hospital, during the period from September 2020 up to February 2021. Purposive sample size included all patients confirmed with severe malaria admitted to ED-Dueim Teaching Hospital during study duration. A 177 children were enrolled in this study. Both primary and secondary data were collected. Primary data was collected using interviews. Face to face interviews was conducted by interviewers who were research assistants. Data was collected by using structured questionnaire, developed by the researcher based on the objectives of the study and explained to the child family in simple Arabic. Due to the complex structure of the questionnaires, they were filled out by the interviewers.

Data Analysis

The collected data was checked, verified, coded, then entered into the computer and analyzed using IBM SPSS advanced statistics version 22 (SPSS Inc., Chicago, IL). Descriptive statistics was used to summarize and organize the data. Numerical data expressed as mean and standard deviation or median and range as appropriate. Qualitative data expressed as frequency and percentage. Chi-square test was used to examine the relation between qualitative variables. For not normally distributed quantitative data, comparison between 3 groups nonparametric ANOVA was used. P-value <0.05 was considered significant for all tests (Figures 1-4 and Tables 1-8).

Results

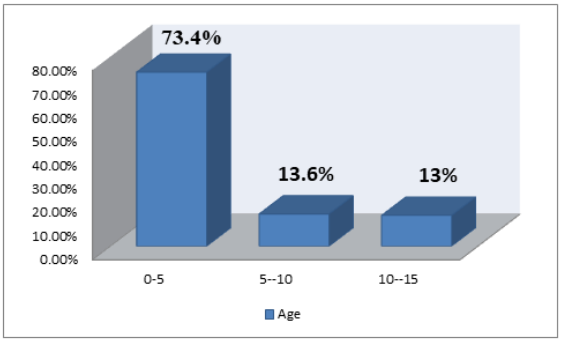

Figure 1. Patients distribution according to age groups, n=177.

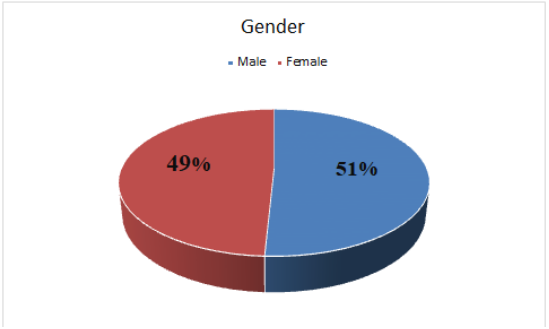

Figure 2. Patients distribution according to gender, n=177.

Tribe	Frequency	Percent
Hawsa	25	14.1
Musalamia	9	5.1

Hassania	45	25.4
Nuba	10	5.6
Shnabla	13	7.3
Dewahia	23	13
Arakia	6	3.4
Shewihat	3	1.7
Muhamadia	4	2.3
Shawaiga	6	3.4
hassanat	12	6.8
Other	21	11.9
Total	177	100

Table 1. Patient's distribution according to tribe.

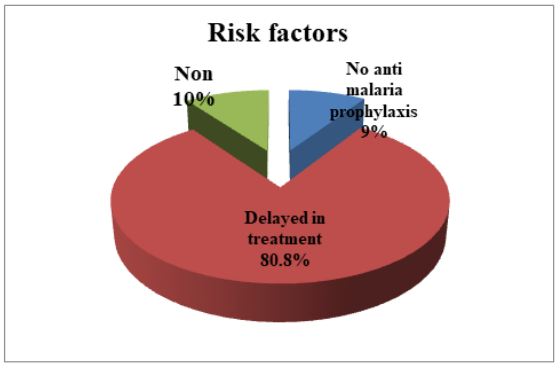

Figure 3. Risk factor of sever malaria among participants, n=177.

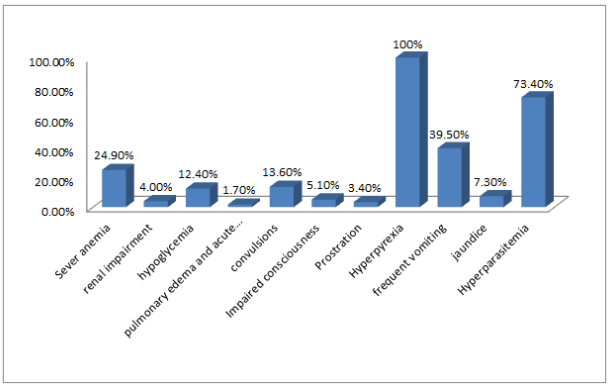

Figure 4. Patients distribution according to criteria of severe malaria, n=177.

	Hb%	TWBCs	Plts
Mean	8.536	11.45	191.084
Std. Deviation	2.2	5.53	157.749
Minimum	2.4	4.5	3
Maximum	12.8	24	655

Table 2. Mean of Hb g/dl, TWBCs count, and plts count among patients.

Random blood glucose	
Mean	73
Std. Deviation	14.34734
Minimum	55
Maximum	109

Table 3. Mean of Random blood glucose among patients.

Plts count	Frequency	Percent
Normal Plts count	91	0.514
Low Plts count	85	0.48
High Plts count	1	0.006
Total	177	100

Table 4. Plts level among patients.

Treatment	Frequency	Percent
Quinine	140	79.1
Artesunate	22	12.4
Quinin shift to artesunate	12	6.8
Artesunte shifted to quinine	3	1.7
Total	177	100

Table 5. Treatments received by patients.

Patients outcome	Frequency	Percent
Recovery	177	100
Death	0	0

Table 6. Patient's distribution according to their outcome.

Age group					P value
	0-5	44839	42278	Total	0.011
Severe anemia	38	6	0	44	
No	92	18	23	133	
renal impairment	4	3	0	7	0.054
No	126	21	23	170	
Hypoglycemia	10	12	3	25	0
No	120	12	20	152	
pulmonary edema and acute respiratory distress syndrome	3	0	0	3	0.57
No	127	24	23	174	
convulsions	18	3	3	24	0.982
No	112	21	20	153	
Impaired consciousness	9	0	0	9	0.18
No	121	24	23	168	
Prostration	0	0	6	6	0
No	130	24	17	171	
frequent vomiting	53	6	11	70	. 000
No	77	18	12	107	
jaundice	13	0	0	13	. 239
No	117	24	23	164	
Hyperparasitemia	98	12	20	130	0.01
No	32	12	3	47	

Table 7. Clinical manifestations and age cross tabulation.

	Hawsa	Musalamia	Hassania	Nuba	Shnabla	Dewahia	Arakia	Shewiha t	Muhamadia	Shawaiga	hassanat	Other	Total	P value
Severe anemia	0	3	8	0	7	8	0	3	0	6	3	6	44	0
Renal impairment	0	3	4	0	0	0	0	0	0	0	0	0	7	0.04
hypoglycemia	3	0	9	0	0	3	0	0	4	3	0	3	25	0
pulmonary edema and acute respiratory distress syndrome	3	0	0	0	0	0	0	0	0	0	0	0	3	0.355
convulsions	8	0	9	0	0	0	0	0	4	0	0	3	24	0
Impaired consciousness	0	0	3	0	3	0	0	0	0	0	0	3	9	0
Prostration	3	0	0	0	0	0	0	0	0	0	0	3	6	0
frequent vomiting	11	3	26	0	6	3	3	0	0	0	6	12	70	0
Jaundice	0	0	6	0	0	7	0	0	0	0	0	0	13	0.034
Hyper parasitemia	25	6	20	7	6	23	6	3	4	3	9	18	130	0

Table 8. Clinical manifestations and tribe cross tabulation.

Discussion

Malaria is one of major health concern of Sudan. Malaria is completely curable if effective treatment started promptly. Delay in effective treatment may lead to devastating consequences including severe malaria and death. In this study majority of severe malaria patients73.4% were with age group under five years old, followed by 13.6% within age group 5-10 years old. Similarly [14]. Stated that majority of severe malaria patients were less than two years old. More over [15]. Study revealed that Most of the children were less than 5 years 69.91%. This supported our study findings. This finding is in accordance with WHO, which states that children less than 5 years are most vulnerable to malaria [16].This study revealed that 51% of patients were male and 49% were female, male slightly more frequent than female. Consistent with study which found that 54.11 % were males and 46.8 were female. Also study reported the male gender was the most affected 53.54% with male to female ratio was 1.15 [17]. Reported 63.6% were male. This indicated that there was a male predominance, which has also been noted in other studies [18,19] Regarding tribes this study revealed that the most common tribe was hassania represent 25.4% of patients, followed by Hawsa were 14%, Dewahia were 13%, hassanat 6.8%, and 5.6% were from nuba. Moreover Statistically significant association between tribe and criteria of anemia. Time spend travelling to a health facility and associated transport costs may influence the decision to seek treatment early for malaria and therefore result in delayed diagnosis and treatment as caregivers option for initial treatment at home. In this study 80.8% of patients develop severe malaria because they delayed in treatment, and 9.2% were due to no anti-malaria prophylaxix, in this contex a study by [20]. 2006 in Sudan, stated that the choice of treatment for sick children among caregivers was highly dependent on accessibility and availability of health facilities. Most people in rural areas live further away from health facilities. The commonest criteria of severe malaria among our patients was hyperpyrexia all patients presented with hyperpyrexia, followed by 73.4% presented with hyper paracytemia, then 39.5% with frequent

vomiting, and 24.9% with severe anemia, while convulsion, hypoglycemia, jaundice, impaired consciousness, renal impairment, and prostration were less common. This slightly similar to study in India which reported most common clinical presentation was fever (94.5%) followed by splenohepatomegaly, pallor and prostration then abnormal bleeding, severe anemia, renal impairments, shock, altered sensorium, convulsion and pulmonary edema. On other hand in cameron study found that the main criteria on admission with sever malaria were prostration, fever with body temperature ≥ 40˚C and convulsions (61.90%, 58.00%, and 30.30% respectively). This variation may due to multiple factors such as parasite, host and environmental factors. Thus the clinical characteristics of severe malaria presenting to rural, peripheral health centers may be different than that observed in referral centers. These findings merit further investigation into the optimal methods for identification and management of severe malaria in rural health centers in the region. Regarding laboratory parameter in this study mean Hb g/dl among patients was 8.53 ± 2.2 g/dl with range (2.4-12.8 g/dl). Low Plts count observed in 51.4% of patients, similarly study among Indian children stated among laboratory parameters, thrombocytopenia was observed in 70.9% and deranged hepatic functions were observed in 25.4% children. Moreover other study reported thrombocytopenia as the most common laboratory abnormality in 60% of severe malaria cases), followed by hyperbilirubinemia anemia, and elevated hepatic aminotransferase levels [21]. Parenteral quinine remains the antimalarial treatment of choice for patients with severe malaria. According to guideline An initial loading dose (20 mg salt/kg) should be given over four hours, followed by 10 mg/kg every eight hours (infused over four hours) [22]. In current series, 79.1% of patients received Quinine, 12.4% were received artesunate, while 6.8% received quinine then shifted to artesunate due to quinine resistance. Because of the mode of action of quinine, peripheral parasitaemia may not decrease and might even continue to increase during the first 24 hours of treatment. This study reported 100% recovery rate, not like study which estimated the mortality rate of 3.80%. Moreover also recorded mortality rate of 4%.

Conclusion

This study revealed statistically significant association between age groups and presenting with anemia, hypoglycemia, prostration, frequent vomiting, and hyperparasitemia. Similar result obtained by that the incidence of anemia and convulsions decreased with age, whereas the incidence of hyperparasitemia, jaundice, and renal insufficiency increased with age. Coma and metabolic acidosis did not vary with age.

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